and Linde systems are very similar, and work "precisely on the same lines." The truth is that the Linde apparatus works with air at three pressures, uses preliminary refrigeration by ice and salt, has widely coiled helices consisting of three pipes placed concentrically one within the bore of another, and takes from two to three hours to liquefy air; while the Hampson and Tripler plants, working from a compressor, both have air at two pressures only; both use no preliminary refrigeration, both have simple pipe closely coiled, and both liquefy air in less than fifteen minutes. It would therefore have been more correct, since the Hampson machine is the older of these two, to change the names used by Dr. Sloane, and say that the Tripler apparatus "is very simple, and resembles very much the" Hampson "apparatus, and it works precisely on the same lines."

The salient feature of the book, as a historical summary and appreciation, is the glorification of Mr. Tripler and American invention. The greatness of Mr. Tripler's achievements is compared to his advantage with the paltry efforts of European experimenters in many places, as on pp. 255, 289, 290, 355, and 356; and on p. 296 he is roundly called 'the originator of the self-intensive system." Dr. Sloane's repeated use of the phrase "back of" instead of "behind" suggests that he is probably an American; and if that is so, patriotism might be allowed to excuse the over-laudation of a fellow-countryman in cases of real merit. It cannot, however, justify the ascription of unreal achievements. Mr. Tripler did not show to the public his liquid air made by the self-intensive method till 1897, nearly two years after that method had been published and fully described in Europe; and as he has produced no evidence of having used it privately before, he cannot be accepted as its "originator." Dr. Sloane, it is true, in a summary of Mr. Tripler's work as the inventor of the self-intensive process, says on p. 288 that "about 1891 air was liquefied" by that gentleman. If this be true, both Dr. Hampson and Dr. Linde must give up their claims to priority; but something more than this vague and unsupported statement is necessary to prove that Mr. Tripler had invented the process before November 1894 and May 1895, the earliest authenticated European dates for the invention. It is indeed inconceivable that, if Mr. Tripler had understood the subject well enough to invent and successfully work the process in 1891, he could in 1893 have devised the futile and absurd scheme described in his patent of that year referred to above. Mr. Tripler's later apparatus, too, is insufficiently explained and authenticated if his claims to the invention of it are to be seriously considered. Dr. Sloane must know that the chief interest of this process centres in the arrangements for expansion and interchange of temperatures, and in illustrating the European systems he very properly gives sectional views which clearly explain the nature of these arrangements. But in illustrating Mr. Tripler's machine, while he gives needless views and descriptions of the rooms, the people, and such well-known appliances as three-stage compressors, coolers, and washers, he shows only the outside of the vitally important interchanger. Why did not Dr. Sloane ask for sectional views of this and of the mysterious "special valve, the invention of Mr. Tripler"? We could then have judged how far they really differ from those shown and used in Europe nearly two years before. He informs us in the preface that his requests for assistance in the compilation of his book met with quick response from Mr. Tripler among others. In connection with liquid-air processes there has been too much mystery made, the public being freely asked for their admiration and faith without being frankly made acquainted with the details of an inventor's process and the evidence of his originality. Strangely enough Dr. Sloane, who so complacently accepts Mr. Tripler's mysteries, is himself, on p. 238, an objector to their prevalence in similar work at the Royal Institution. So much attention has lately been excited by Mr. Tripler's scheme for using liquid air as a means of providing unlimited power without cost, that Dr. Sloane might fairly have been expected to give his unscientific readers some useful guidance by explaining how these schemes violate hitherto inviolable laws as to the latent heat of volatilisation of gases, and are, in fact, blunders due to a mistaken interpretation by Mr. Tripler of one of his experiments. Instead of this. Dr. Sloane, on p. 289, gives Mr. Tripler's schemes a mild approval and support by saying that

> "the utilisation of the low-grade heat energy of the universe presents nothing essentially impossible. This heat Tripler hopes to utilise. If it is utilised, &c. . . ."

Such toleration of Mr. Tripler's amazing proposals would disqualify any writer as a serious scientific critic.

A MANUAL OF ANTHROPOLOGY.

The History of Mankind. By Prof. Friedrich Ratzel. Translated from the second German edition by A. J. Butler, M.A.; with Introduction by E. B. Tylor, D.C.L., F.R.S. With coloured plates, maps, and illustrations. Three volumes. Pp. xxiv + 486 + 562 + 599. (London: Macmillan and Co., Ltd., 1896.)

THE student of anthropology will welcome this handsome English edition of Prof. Ratzel's "Völkerkunde" as an invaluable work of reference for the numerous and scattered branches of his study. Perhaps no department of science embraces so large a field as the study of man and the history of civilisation, and in proportion to its complexity the greater is the necessity for some general guide to the subject. On the first publication of the work in the years 1885–88 it was at once recognised as the most comprehensive survey of the state of our knowledge of the lower races of mankind that had hitherto appeared, and since that time it has maintained its position in Germany as the standard popular work on the subject. The present English translation has been made from the second German edition and may therefore be regarded as in all essentials abreast of recent research. In his Introduction, Prof. Tylor has called attention to the large number and accuracy of the illustrations with which the book is furnished, and which he well remarks surpass in excellence any that have yet been issued in similar works intended for general circulation. The importance of good illustrations in contrasting the successive stages of the development of the human race cannot be over-estimated, for they convey far more to the general

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reader than long descriptions and strings of technical terms.

In the main the book may be regarded as the best introduction yet available for the beginner who wishes to gain a general knowledge of anthropology and its results as applied to the study of the barbarous and more primitive races of the world. The book is not intended as a guide to the literature of the subject, nor as a work of reference for every specialist in his own department of the science, but is throughout addressed to the general reader. With this aim in view, Prof. Ratzel has disencumbered his pages of all foot notes and references to authorities, and has applied himself to giving, as far as possible, a sketch of results without overloading any portion of his work with the discussion of technical or unnecessary detail. In so doing, the author has been well advised, for not otherwise could his outline have approached completeness within the limits to which it was necessarily restricted.

Prof. Ratzel has treated his subject in five sections or books, the first of which is introductory, while the others roughly correspond to the principal ethnological divisions of the human race. In Book i. he has given a very clear sketch of the principles of ethnography, describing the distribution and general aspects of mankind, the rise of civilisation, and the development of language, religion, science and art, and family and social customs. The next three books describe the more important undeveloped races of the present day. Thus Book ii. deals with the American Pacific group of races, under which heading are included the races of Oceania, the Australians, the Malays and Malagasies, the American tribes, including the ancient civilised races of America, and the Arctic races of the Old World. Book iii. is devoted to the light stocks of South and Central Africa, such as the Bushmen, the Hottentots and dwarf races, while Book iv. deals with the Negro races found throughout Africa. Book v., the last section of the volume, gives a general sketch of the cultured races of the Old World. This brief summary of the contents of the volumes will serve to indicate the very comprehensive character of this history of mankind. The treatment of some of the sections of the book might perhaps have been a little fuller with advantage, but, even in sixteen hundred pages, considerable condensation was obviously necessary; and with so trustworthy a guide as Prof. Ratzel the reader need not fear that any essential facts have been inadvertently overlooked. A special word of praise should be given to Mr. Butler, not only for the excellence of his translation, but also for the care with which he has verified and corrected the descriptions of the numerous illustrations in the text.

OUR BOOK SHELF.

A Theory of Reality. By Prof. George Trumbull Ladd. Pp. xv + 556. (London: Longmans, Green, and Co., 1899.)

PROF. TRUMBULL LADD'S "Theory of Reality," though intelligible in isolation, is a sequel to his "Philosophy of Knowledge" published in 1897, and a link in a chain of development beginning so far back as 1887. The Yale professor makes severe demands upon his public. His voluminous and discursive activity has now produced its fifth harvest, and we take it that there is at least a sixth to come. A certain condensation, therefore, and the taking of some things, *e.g.* the propriety of metaphysics, for granted, would not be out of place. Whatever be the case with the category of time, the reader's time is not unlimited. As compared, however, with its immediate forerunner, the irrelevance and repetition in the present work are only relative. And the review of his intellectual progress, with which the book closes, accounts in a not uninteresting way for his tiresome method of exposition.

Prof. Ladd's theory, which is avowedly speculative, may be described as a Realism of Spirit. It takes its starting-point from self-felt activity, finds "trans-subjective" elements involved in every cognition, and projects upon these by way of analogy the notion that they, too, are real centres of self-activity. "Things are known as imperfect and inferior selves." "The inner reality of all beings is spirit." "The transcendental reality of time is the all-comprehending life of an absolute self." "Viewed in its ontological aspect, all the growth of man's cognitive experience reveals the being of the world as a unity of force, that is constantly distributing itself amongst the different beings of the world so as to bestow on them a temporary *quasi*-independence, while always keeping them in dependent inter-relations, for the realisation of its own immanent ideas." This is not idealism, though in its affirmation of spiritual unity it steals the idealist's thunder. The nature of our knowledge of self and of the dynamical character of its agency necessitates realism; though, on the other hand, because connection according to some law must be predicable of reality, we are able, in the most satisfactory chapter of the book, to consider reality as an actual harmony of categories.

The interdependence, and neither independence nor dependence, of the categories is admirably treated, and Prof. Ladd discusses each in turn. He has in general (Pref., p. ix.) submitted the chapters which come into closest relations with the physical sciences to expert friends and colleagues. The treatment, however, of matter and ether as separate kinds of entity, though it may follow from his scientific definition of matter, presents difficulty to the metaphysical reader. Is ether then immaterial? The explanations of pp. 447–448 only partially solve the knot. Nor is it possible to agree with the symbolisation of time as a continuous flow of n infinites, and of space as in each moment an infinite content which equals and is known to equal n terms (p. 250). Prof. Ladd's point is, of course, to express the infinite simultaneous, but his symbols are misapplied.

H. W. B.

Great and Small Game of Africa; an Account of the Distribution, Habits, and Natural History of the Sporting Mammals, with Personal Hunting Experiences. Edited by H. A. Bryden. Pp. xx + 612; illustrated. (London: Rowland Ward, Ltd., 1899.)

THIS magnificent volume is a unique work on the subject of which it treats; the greater part of the text being written by well-known African sportsmen (among whom Mr. F. C. Selous occupies a prominent position), while a naturalist is responsible for the classification, nomenclature, and the leading distinctive features of the main groups. It is thus written throughout as the result of actual experience, and accordingly possesses a value far above the ordinary type of natural histories. Although mainly written for sportsmen, the professional zoologist cannot fail to find much matter bearing upon his own studies; and the African sportsman should no longer have any difficulty in identifying any of the species (unless they be new) which may fall to his rifle. The coloured illustrations, which for the most part are restricted to figures of the heads of the various species, are all that can be desired, both from an artistic and a zoo-

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